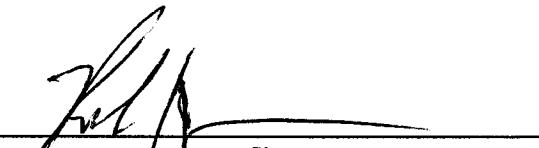


<b>PRE-APPEAL BRIEF REQUEST FOR REVIEW</b>		Docket Number: 12732-0170001
<p>I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Mail Stop AF, Commissioner for Patents, Box 1450, Alexandria, VA 22313-1450.</p> <p>Date of Deposit _____</p> <p>Signature _____</p> <p>Typed or Printed Name of Person Signing Certificate _____</p>	Application Number 10/689,617	Filed October 22, 2003
	First Named Inventor Satoru Okamoto	
	Art Unit 1792	Examiner Mahmoud Dahimene
	_____	
<p>Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.</p> <p>This request is being filed with a Notice of Appeal.</p> <p>The review is requested for the reason(s) stated on the attached sheet(s).</p> <p>Note: No more than five (5) pages may be provided.</p> <p>I am the</p> <p><input type="checkbox"/> applicant/inventor.</p> <p><input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)</p> <p><input checked="" type="checkbox"/> attorney or agent of record <u>55,108</u> (Reg. No.)</p> <p><input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____</p> <p>NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below'.</p> <p><input checked="" type="checkbox"/> Total of <u>5</u> forms are submitted.</p>		
 Signature <u>Roberto J. Devoto</u> Typed or printed name <u>(202) 783-5070</u> Telephone number <u>2 November 2009</u> Date		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Satoru Okamoto Art Unit : 1792  
Serial No. : 10/689,617 Examiner : Mahmoud Dahimene  
Filed : October 22, 2003 Conf. No. : 4799  
Title : METHOD FOR CLEANING PLASMA ETCHING APPARATUS, METHOD  
FOR PLASMA ETCHING, AND METHOD FOR MANUFACTURING  
SEMICONDUCTOR DEVICE

**Mail Stop AF**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

## PRE-APPEAL BRIEF REQUEST FOR REVIEW

Pursuant to United States Patent and Trademark Office OG Notices: 12 July 2005 - New Pre-Appeal Brief Conference Pilot Program, a request for a review of identified matters on appeal is hereby submitted with the Notice of Appeal. Review of these identified matters by a panel of examiners is requested because the rejections of record are clearly not proper and are without basis, in view of a clear legal or factual deficiency in the rejections. All rights to address additional matters on appeal in any subsequent appeal brief are hereby reserved.

Independent claims 1, 8, 29, 36, 57, 64, 71, 78 and 85, and their dependent claims, have been rejected as failing to comply with the enablement requirement and as being indefinite. Claims 1-7, 15-21 and 57-95 have been rejected as being unpatentable over Chow (U.S. Patent No. 6,872,322) in view of Liu (U.S. Patent No. 6,566,270), Wolf (Silicon Processing for the VLSI Era), Choi (U.S. Patent Application Publication No. 2003/0207585) and Nakajima (U.S. Patent Application Publication No. 2002/0053674). Claims 8-13 and 22-28 have been rejected as being unpatentable over Chow in view of Liu, Nakajima, Choi and Wolf. Claims 29-35 have been rejected as being unpatentable over Chow in view of Ye (U.S. Patent No. 5,756,400), Nakajima, Choi and Liu. Claims 43-56 have been rejected as being unpatentable over Chow in view of Liu, Nakajima, Choi, and Wolf. Claims 42, 49, 56, 62, and 69 have been rejected as being unpatentable over Chow in view of Liu, Lu (U.S. Patent No. 6,352,081), Izawa (U.S. Patent No. 6,842,658), Nakajima, Choi, and Wolf.

Applicants specifically ask the panel to review the issues highlighted below.

1. Independent claims 1, 8, 29, 36, 57, 64, 71, 78 and 85, and their dependent claims, comply with the enablement requirement and are definite in scope.

The Examiner asserts that the term "BO<sub>x</sub>" is not enabling and is unclear because there is "no sufficient direction or guidance in the claim or the specification to determine which 'BO<sub>x</sub>' is cleaned by the plasma." The Examiner then appears to assert that enablement further requires that the "x" in the term "BO<sub>x</sub>" be defined, and asserts that the statement set forth in the specification "BO<sub>x</sub> compounds, such as B<sub>2</sub>O<sub>3</sub>" (see paragraph 0026 of published application) is incorrect because "BO<sub>x</sub> has only one B (boron) atom in the molecule, whereas B<sub>2</sub>O<sub>3</sub> has two." As stated in the response to the Office Action of December 19, 2008, applicants disagree with the Examiner and assert that the application specification is enabling with respect to the above claims because a person of ordinary skill in the art would have recognized, based on the term BO<sub>x</sub> and the clear and unequivocal statement set forth in the application ("BO<sub>x</sub> compounds, such as B<sub>2</sub>O<sub>3</sub>"), that the contemplated process is applicable to any residue that comprises a boron oxide compound, that the compound can have more than one boron atom, and that the term "x" is a ratio of oxygen to boron atoms. The Examiner's assertion that B<sub>2</sub>O<sub>3</sub> is not an example of a BO<sub>x</sub> is premised on his insistence that only one definition of the term BO<sub>x</sub> is possible - his own definition, in which BO<sub>x</sub> is a compound with a single boron atom and in which "x" indicates an integer number of oxygen atoms. This definition is clearly contrary to that set forth in the application specification, in which the term BO<sub>x</sub> indicates a boron oxide compound that can have more than one boron atom and "x" indicates the ratio of oxygen to boron atoms. Thus, B<sub>2</sub>O<sub>3</sub> is an example of a particular BO<sub>x</sub> in which there are two boron atoms and "x"=3/2=1.5.

On pages 35 and 36 of the Final Office Action, the Examiner reiterated his insistence on using his own definition of the term BO<sub>x</sub> and again stated his confusion regarding the application: "...the examiner respectfully disagrees because expressions such as BO<sub>x</sub> usually refer to one boron atom (B) and any (x) number of oxygen (O). The fact that the applicant states that BO<sub>x</sub> could read on B<sub>2</sub>O<sub>3</sub> only emphasizes the fact that the term BO<sub>x</sub> is not properly described in the claims and/or specification because the examiner respectfully maintains that B<sub>2</sub>O<sub>3</sub> is more conventionally described by the formula B<sub>y</sub>O<sub>z</sub> where y is an integer of any number greater than zero and z is an integer of any number greater than zero. Applicant did not define what x is or what it can be, in addition, the applicant does not even mention that B could mean

B2 or B3 or By where y is apparently unknown or could take any expression desired by the reader. Therefore, the examiner maintains that the term is not enabling because there is no sufficient direction or guidance in the claim or the specification to determine which 'BO<sub>x</sub>' is cleaned by the plasma." Applicants disagree and respectfully request reversal of this rejection as being in clear error.

The Examiner asserts that the "applicant did not define what x is or what it can be, in addition, the applicant does not even mention that B could mean B2 or B3 or By." Contrary to the Examiner's assertion, the application specification, by including the clear and unequivocal statement "BO<sub>x</sub> compounds, such as B<sub>2</sub>O<sub>3</sub>" (see paragraph 026 of the published application) defines x as being merely a ratio of oxygen to boron atoms. Moreover, in stating that B<sub>2</sub>O<sub>3</sub> is a BO<sub>x</sub> compound, the application is clearly and unequivocally stating that B in the expression BO<sub>x</sub> could be B<sub>2</sub>. Even if such a clear statement were not deemed to explicitly define x, the statement, at the very least, clearly implicitly defines x as a ratio of oxygen to boron atoms. As stated in MPEP 2111.01 (IV), "the meaning of a particular claim term may be defined by implication, that is, according to the usage of the term in the context in the specification." In this case, the application specification defines the claim term BO<sub>x</sub>, if not explicitly, then implicitly as a boron oxide compound having a ratio x of oxygen to boron atoms, wherein the ratio x need not be an integer. For at least these reasons, the rejections of claims 8, 29, 36, 57, 64, 71, 78 and 85, and their dependent claims are in clear error and should be reversed.

2. The pending claims are patentable over Chow in view of Choi and one or more of Wolf, Nakajima Liu, Ye, Lu, and Izawa

Each of the pending claims recites performing an etching step of a conductive film in a chamber, cleaning the chamber to remove BO<sub>x</sub> adhered to an inside of the chamber, and then performing another etching step of the conductive film in the chamber. Applicants request reversal of the rejections of the pending claims because neither Chow, Choi, Wolf, Nakajima, Liu, Ye, Lu, Izawa, nor any proper combination of the eight describe or suggest these features.

The Examiner's rationale for inserting a chamber cleaning step between two consecutive etching steps of the other references to arrive at the recited limitations is that such an insertion, according to Choi's teachings, would "be desirable." In making this assertion, the Examiner entirely neglects that the manufacturing process taught in Choi in which the chamber cleaning

step is inserted between two different etching steps is substantially different than that recited in the claims and that described in the other references. In entirely neglecting the specifics of Choi's manufacturing process, the Examiner is essentially making the broad assertion that Choi's teachings would have been understood by a person of ordinary skill in the art to stand for the general proposition that insertion of a chamber cleaning step between any two etching steps in every manufacturing process is desirable. Applicants disagree.

Applicants note that inserting a chamber cleaning step between two etching steps is NOT "desirable" in every manufacturing process. For example, adding a chamber cleaning step may increase the complexity of the process by adding an extra step that can introduce additional manufacturing problems and also may decrease the manufacturing through-put by slowing down the manufacturing process. Thus, insertion of a chamber cleaning step between two etching steps in a manufacturing process may only be desirable when the harm caused by not cleaning the chamber between the two etching steps outweighs the harm caused by the additional processing complexity and decreased throughput.

Choi teaches that it is desirable to perform a process chamber cleaning step in a specific manufacturing process for silicon nitride spacers in a capacitive structure between a first physical-type etching step of silicon nitride over a TEOS insulating film and a second chemical-type etching step of the remainder of the silicon nitride over the TEOS insulating film. The chamber cleaning step was inserted into Choi's process because of the desire to remove harmful nitrogen-containing compounds created after the first etching step. Thus, a person of ordinary skill in the art would have, at best, understood Choi to teach that insertion of a chamber cleaning step between a first physical-type etching step of silicon nitride over a TEOS insulating film and a second chemical-type etching step of the remainder of the silicon nitride over the TEOS insulating film would "be desirable" because the harm caused by not removing the nitrogen-containing compounds outweighs the harm caused by the additional processing complexity and throughput loss caused by the extra chamber cleaning step.

Choi's manufacturing process, however, is very different from the manufacturing process contemplated by the claims at issue and described in the other references, and, given this difference, applicants submit that a person of ordinary skill in the art would NOT have turned to Choi's teachings when considering whether it would be desirable to insert a chamber cleaning

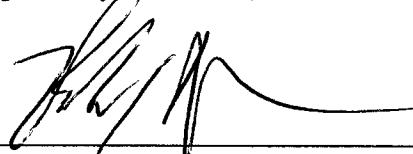
step between a manufacturing process having the recited two etching steps. In particular, the recited two etching steps are very different from those described in Choi (i.e., the first and second etchings in the claims are of a conductive film while those in Choi's process are of silicon nitride) and the target of the recited chamber cleaning step is very different from that described in Choi (i.e., the target of the chamber cleaning step in the claims is BO<sub>x</sub> (i.e., boron oxide) while that in Choi's process is nitrogen-containing compounds).

Applicants note that none of the references recognize the harmful effects caused by BO<sub>x</sub> residue in a chamber that may arise after a first etching of a conductive film and that, if not removed prior to a second etching of the conductive film, can cause skirting, as shown in page 8, lines 9-15 of the application. The inventors of the present application recognized this harmful effect and, therefore, chose to insert an additional chamber cleaning step, despite the extra processing complexity and decrease in throughput, to decrease this effect.

In sum, applicants submit that a person of ordinary skill in the art would not have inserted an additional chamber cleaning step in the manufacturing processes described in the other references based on Choi's teachings to arrive at a process that satisfies the above-noted features because such an insertion is not supported by Choi and is the product of impermissible hindsight in view of applicant's own disclosure. For at least these reasons, applicants request reversal of the Examiner's rejections of the pending claims.

No fee is believed to be due. Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,



\_\_\_\_\_  
Roberto J. Devoto  
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Date: 2 November 2009

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